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GENERAL DYNAMICS | CONVAIR

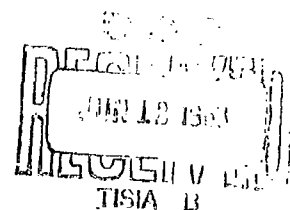
Report No. 8926-104

Material - Finishes and Coatings - Reflective Tapes -
No. 630, 633 and 3270, Minnesota Mining and
Manufacturing Co.

Reflectance Characteristics

B. H. Faulkenberry, F. M. Graber, E. E. Keller

7 May 1959



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GENERAL DYNAMICS | CONVAIR

MODEL
DATE

PAGE
REPORT NO.

Report No. 8926-104

Material - Finishes and Coatings - Reflective Tapes -
No. 630, 633 and 3270, Minnesota Mining and
Manufacturing Co.

Reflectance Characteristics

Abstract

The specular reflectance of Minnesota Mining and Manufacturing Co. No. 633 gold colored D.S. Scotchcal, and No. 630 chrome colored D.S. Scotchcal films, and No. 3270 silver W/A D.S. Flat Top (R) Scotchlite reflective film was determined in the 0.35 to 2.5 micron wavelength range with a Beckman DK-2 recording spectrophotometer, and in the 1.0 to 15 micron wavelength range with a Beckman IR-4 recording spectrophotometer. Recordings of all measurements are given.

Reference: Faulkenberry, B. H., Graber, F. M., Keller, E. E.,
"Reflectance Characteristics of Reflective Tapes,"
General Dynamics/Convair Report 59-191, San Diego,
California, 7 May 1959. (Reference attached).

ANALYSIS

PREPARED BY B.H. Faulkenberry

CHECKED BY F.M. Graber

REVISED BY

CONVAIR

SAN DIEGO

PAGE 1

REPORT NO. MP-59-191

MODEL MISC.

DATE 5-7-59

OBJECT:

To determine the reflectance vs. wavelength of No. 633, No. 630 and No. 3270 reflective tapes which were received from the Minnesota Mining and Manufacturing Company.

TEST SPECIMENS:

1. No. 633 Gold Colored D.S. Scotchcal Brand Film
2. No. 630 Chrome Colored D.S. Scotchcal Brand Film
3. No. 3270 Silver W/A D.S. Flat-Top (R) Scotchlite Brand Reflective Sheeting.

TEST PROCEDURE:

A Beckman DK-2 recording spectrophotometer was used to determine the diffuse and total reflectance over the range of 0.35 to 2.5 microns. The ~~total~~ ^{specular} reflectance over this range was calculated by using the following relationship:

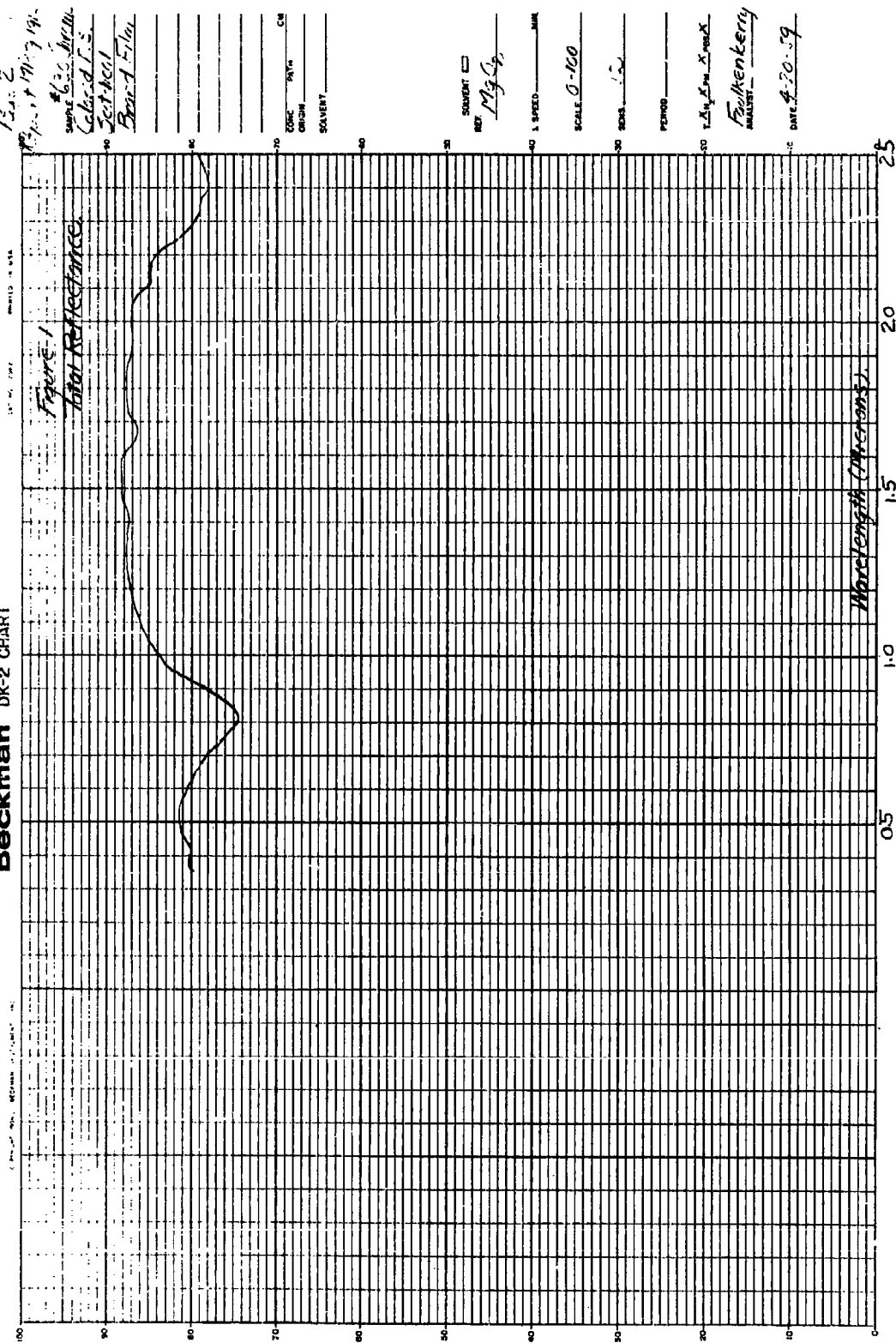
$$\text{Total Reflectance} = \text{Diffuse Reflectance} + \text{~~Specular~~ ^{Specular} Reflectance.}$$

A Beckman IR-4 spectrophotometer was used to determine the ~~specular~~ ^{specular} reflectance of the three samples over the range of 1.0 to 15 microns. The specimens were maintained at room temperature for all measurements.

RESULTS:

The reflectance characteristics of the three reflective tapes are shown in Figures I through XII.

Beckman DK-2 CHART



Doc. 2007
11-11-2007

Case No. 2449

Figure 2
Diffusive Reflection

H/2-100
 100-100
 100-100
 100-100

CONC. _____ CM
 ORIGIN _____
 SOLVENT _____

SOLVENT ☐
REF. MgO

2. SPEED _____ MIN.

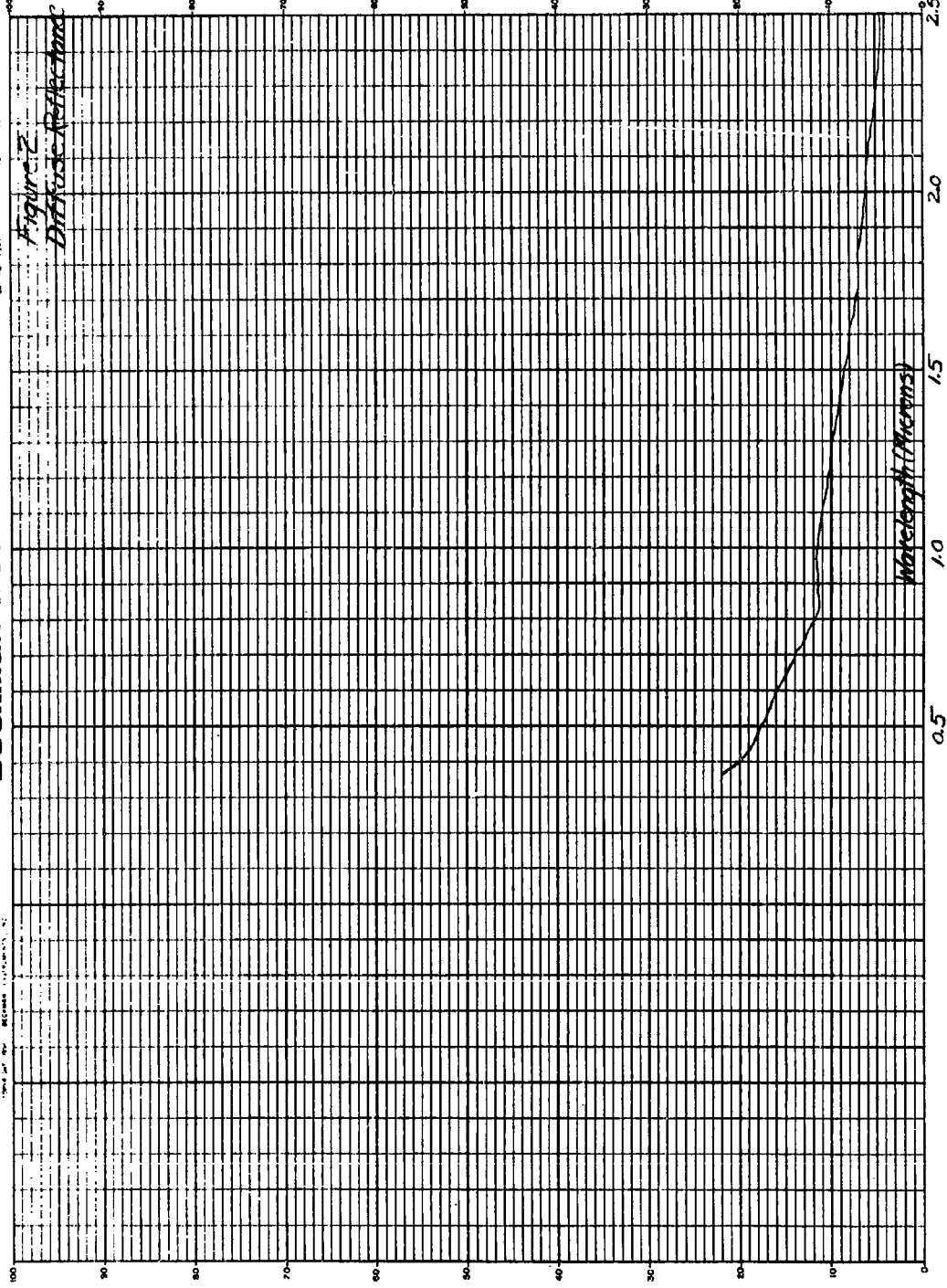
SCALE 0-100

Sum 12

PENNYCO _____

Falkenberg

DATE 4-20-59



Beckman DK-2 CHART

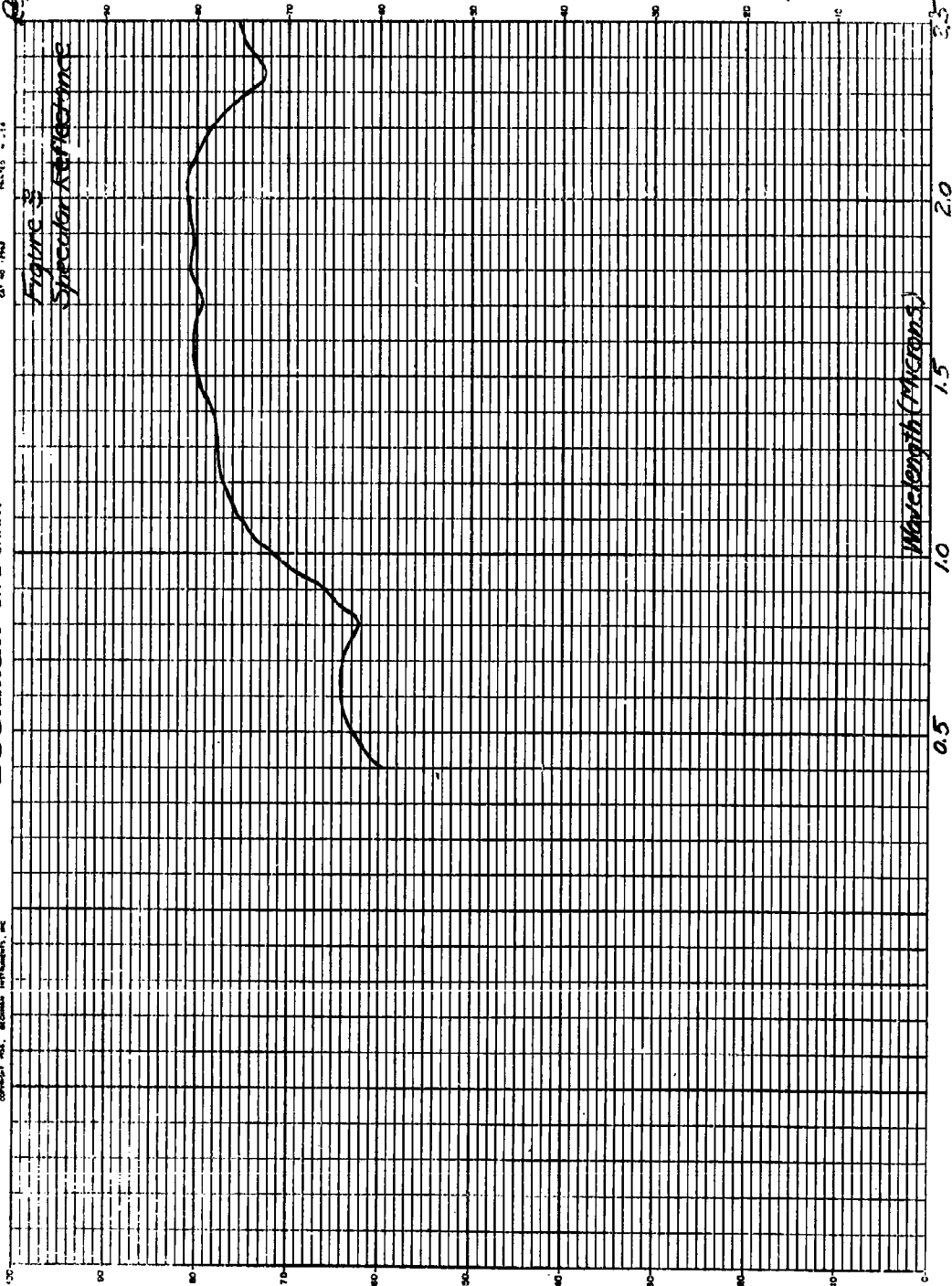
CONTRACT NO. BECKMAN INSTRUMENTS, INC.

CAT. NO. 1742 PLATES 4-16

Figure 3
Spectroscopic Absorbance

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Sample No. 130 Chem:
Coated P.S.
Scotchcal
Broad Film



SOLVENT ☐

REF ☐ MgO2

1. SPEED ☐ MIN

SCALE 0-100

25.5 12

PERIOD

2. X ☐ 10 X ☐ 100 X ☐

Analyst *Frederick J. Perry*

DATE

Page 2
Report M259-191

642 44 12043

CONVENT 404, MICHAEL J. MURPHY, INC.

Figure 4
Total Resistance

#633 Gromic
Colored P.S.
Scotchcal
Brand Tape

CONC. _____ CM
ORIGIN _____
SOLVENT _____

SOLVENT ☐
REF. MgO₂

NO. 1 SPEED — 1000

SCALE 0-100

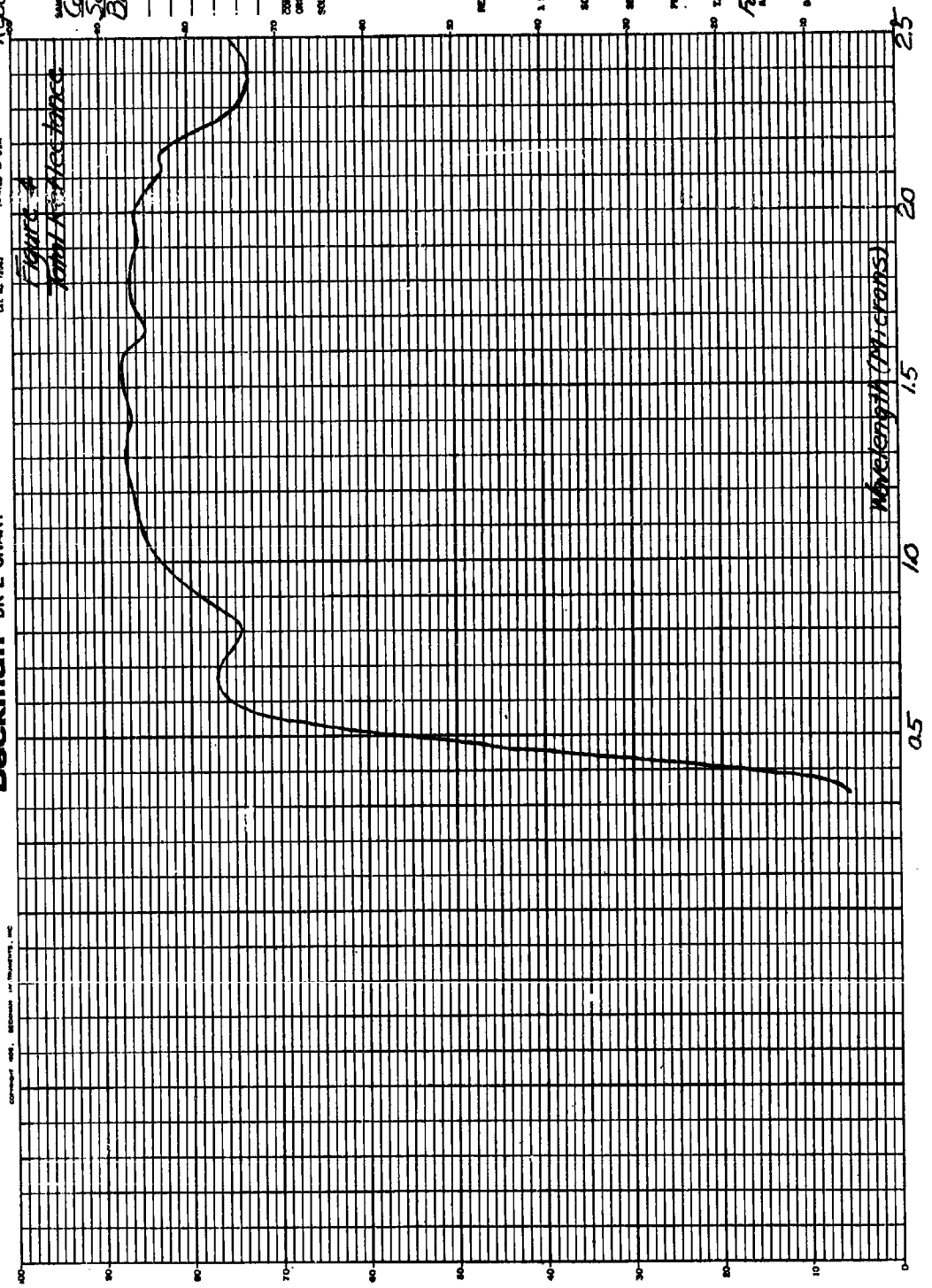
no 2012 12

PUNDO _____

CO 7X N₂X₂N₂X₂N₂X₂

Foulkenberry
ANALYST

DATE 4-20-59



Beckman DK-2 CHART

Page 6
Report 19-191

#633 Gold
Colored P.S.
Scotchcal
Brand Film

DATE NO. 191912 PRINTED IN U.S.A.

Figure 5
Diffuse Reflectance

CONC. _____
CELL _____
WAVELENGTH _____
SOLVENT _____

SOLVENT _____
WAVELENGTH _____

SCALE 0-100

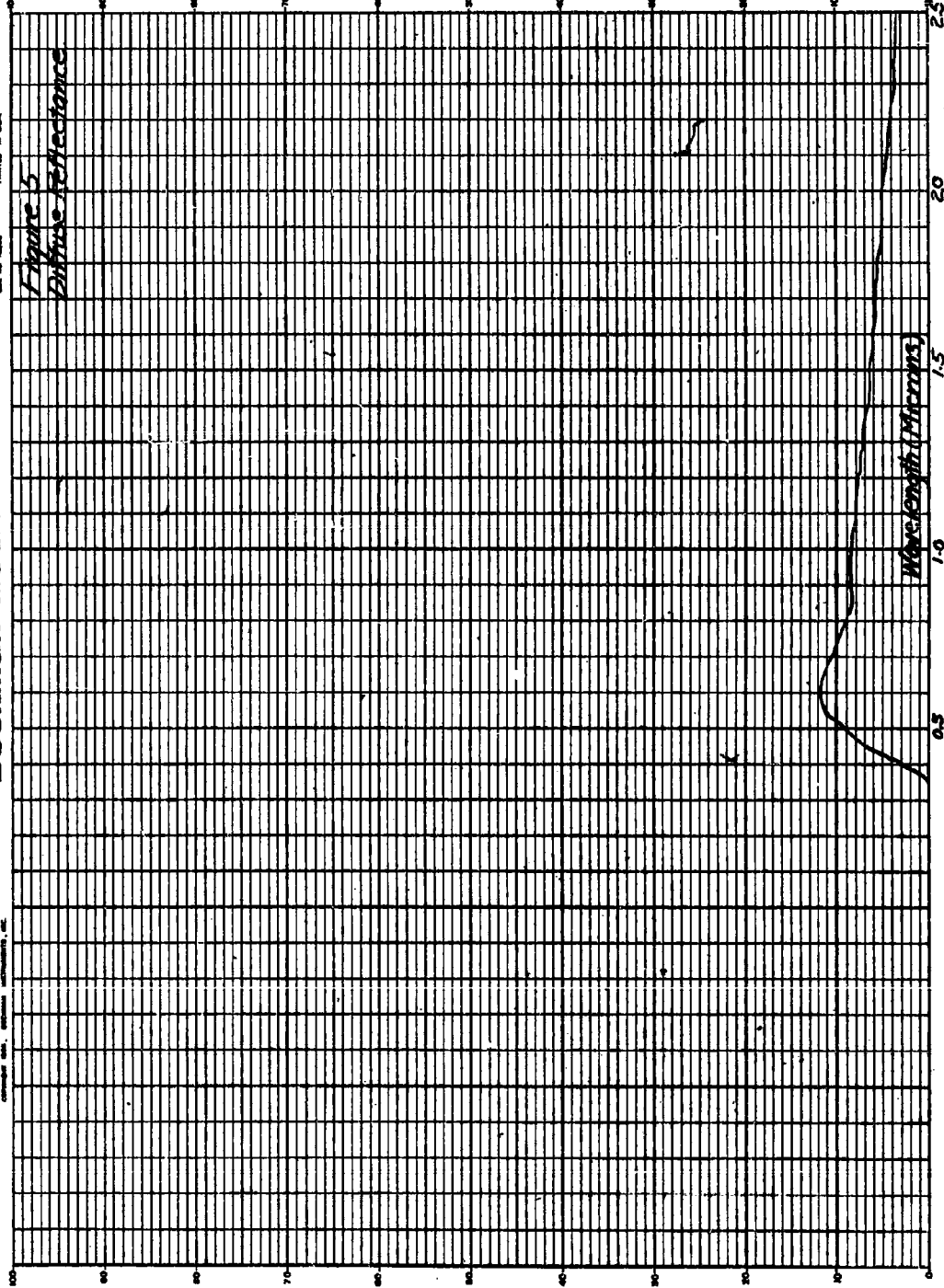
WAVELENGTH 12

TEMP. _____

WAVELENGTH 12

Falkenberg
ANALYST

DATE 4-20-59



[illegible]

Q-22. and (b)(6) 10/15/73 in 92A

Page 7

Figure 7
Specular Reflectance

Report MP59-191

sample 633 Gold

ColoredScotchcol
Bond Film

THE CONCEPT

1000

CONF. WITH CM

CRACK _____

CRACK _____

[illegible]

1

SUBJ. *Man.*

1977

DATE _____ CITIES &

2-100

SCALE 2, 100

12

SECRET

22.11.2014

Faulkenberry

ANALYST _____

DATE 4-20-59

Year	Percentage of Respondents
1990	65
1992	75
1994	70
1996	78
1998	85
2000	90

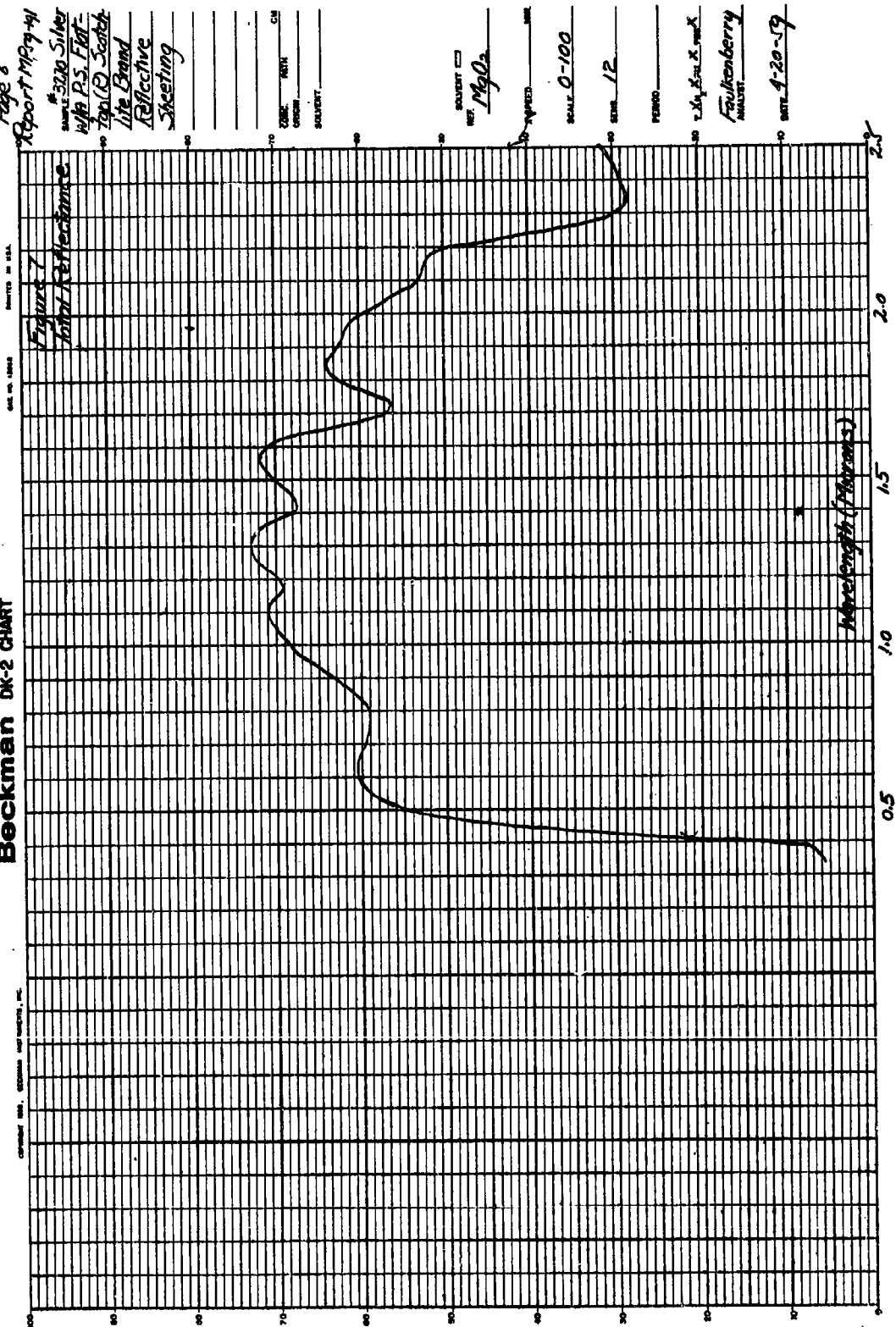
1. *Journal of the American Medical Association*, 2000; 283: 2689-2695.

Beckman DK-2 CHART

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SAMPLE #3220 Silver
with P.S. Flat-
Top (D) Scotch
Life Guard
Reflective
Sheeting

Figure 7
Total Reflectance



ZONE PATH CM
CROWN
SOLVENT

SOLVENT ☐
REF MgO₂

SCALE 0-100

SERIAL 12

PERIOD

ANALYST McLellan, K. J.

ANALYST Falkenberg

DATE 4-20-59

Wavelength (microns)

Page 9
Report MP9-191.

COMPANY: IBM, BUSINESS MACHINES CORP.

DATE NO. 12042

FORM 1041-2 (9-19-74)

Figure 8
Diffuse Reflectance

#3270 Silver
W/PA P.S. Flat
top (R) Scotch
lite Brand
Reflective
Sheeting

CONF. WITH _____
ORIGIN _____
INVENT _____

SOLVENT ☐ MeOH

TESTED **MADE IN U.S.A.**

SCALE 0-100

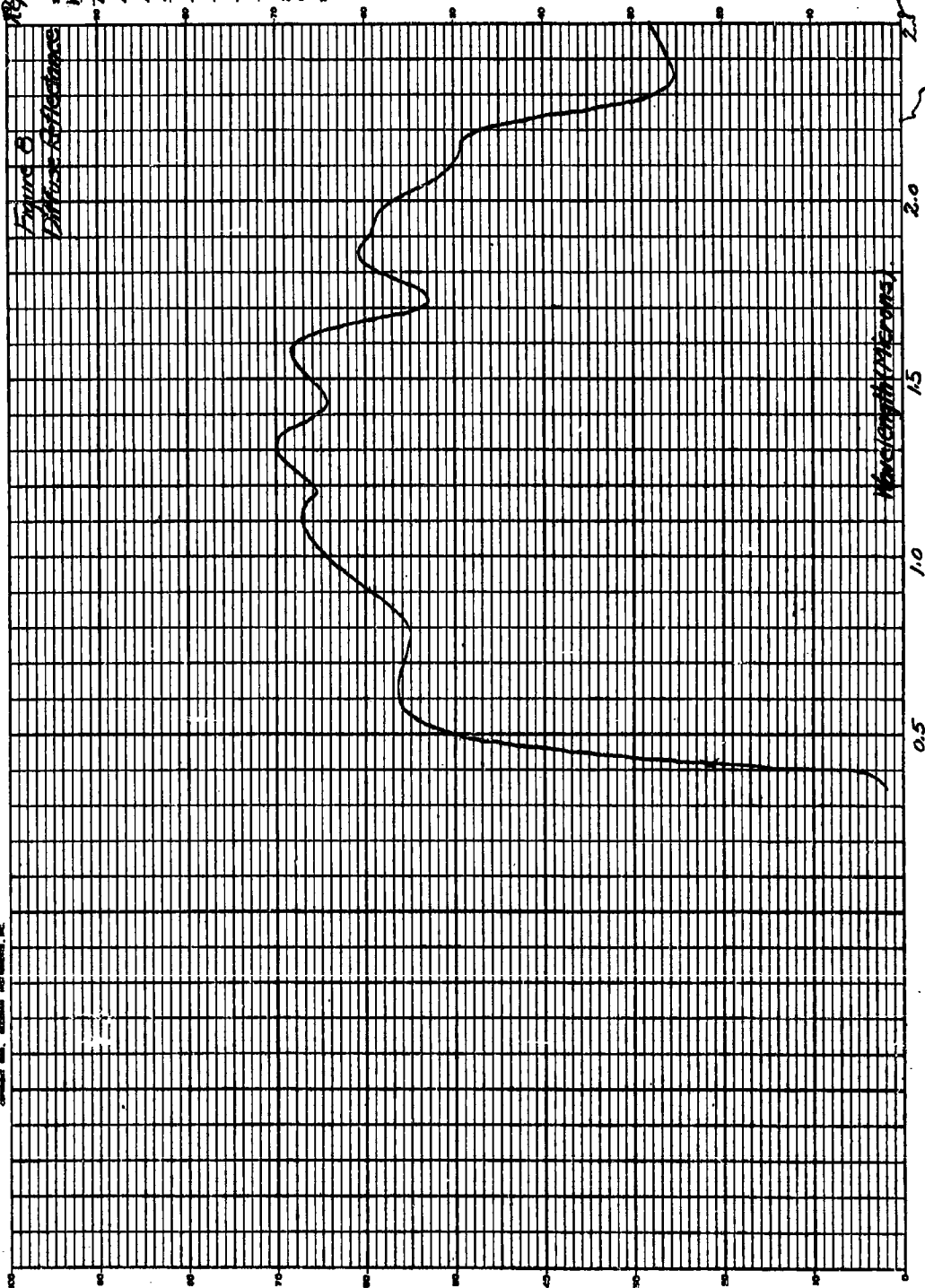
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Principles

TX₁ TX₂ TX₃ TX₄

Foulkenberry

DATE 4-20-59



Beckman DX-2 CHART

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Report MP19-44

DATE OF 1944 PRINTED IN U.S.A.

3220 Silver
with RS-Solids
like Brand
Reflective
Sheeting

Figure 4
Specular Reflectance

COPYRIGHT 1944, BECKMAN INSTRUMENTS, INC.

COAT CONC. PAINT CHARGE SOLVENT

SOLVENT ☐
REF. MgO₂

1. SPEED MM

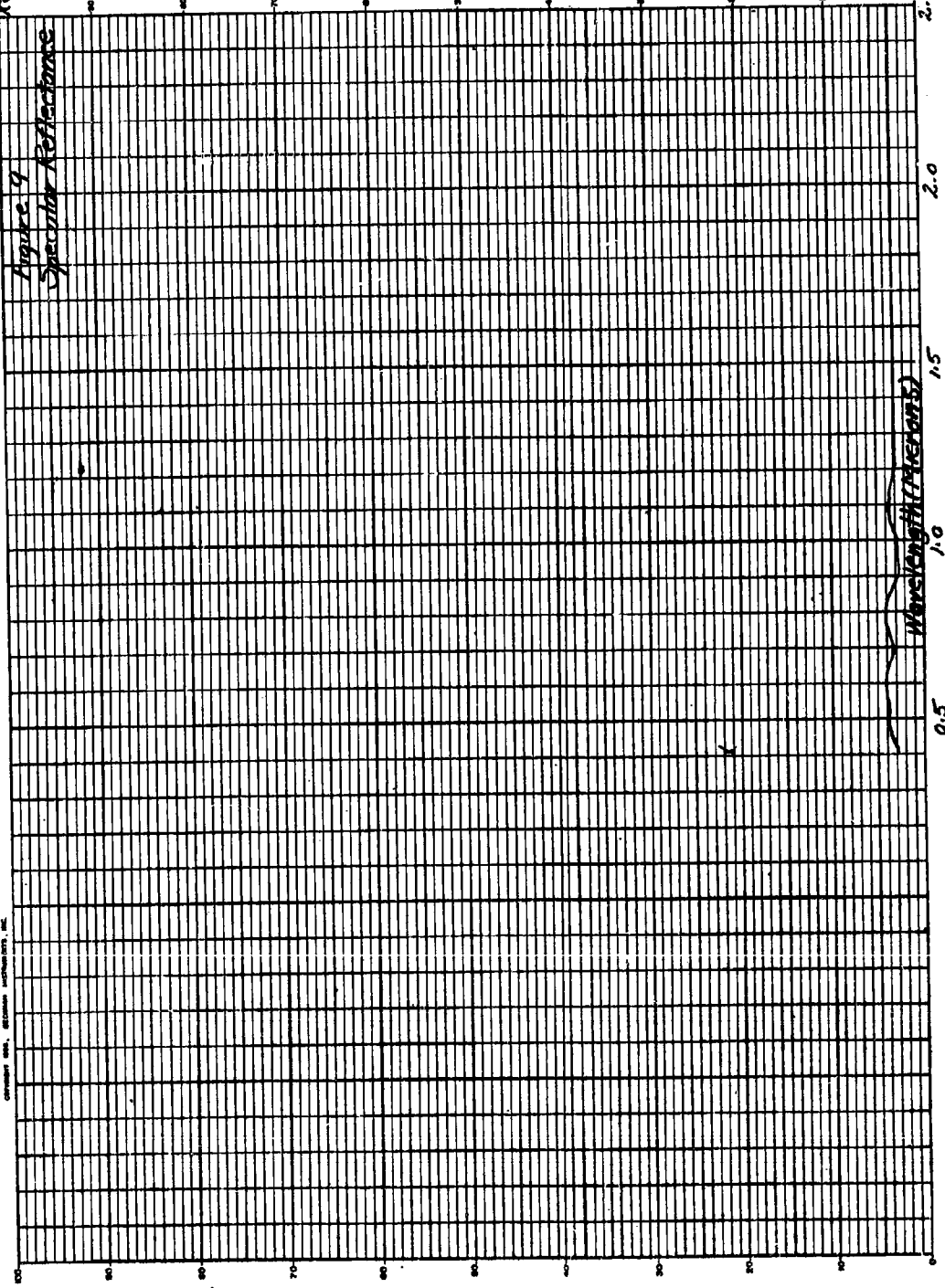
SCALE 0-100

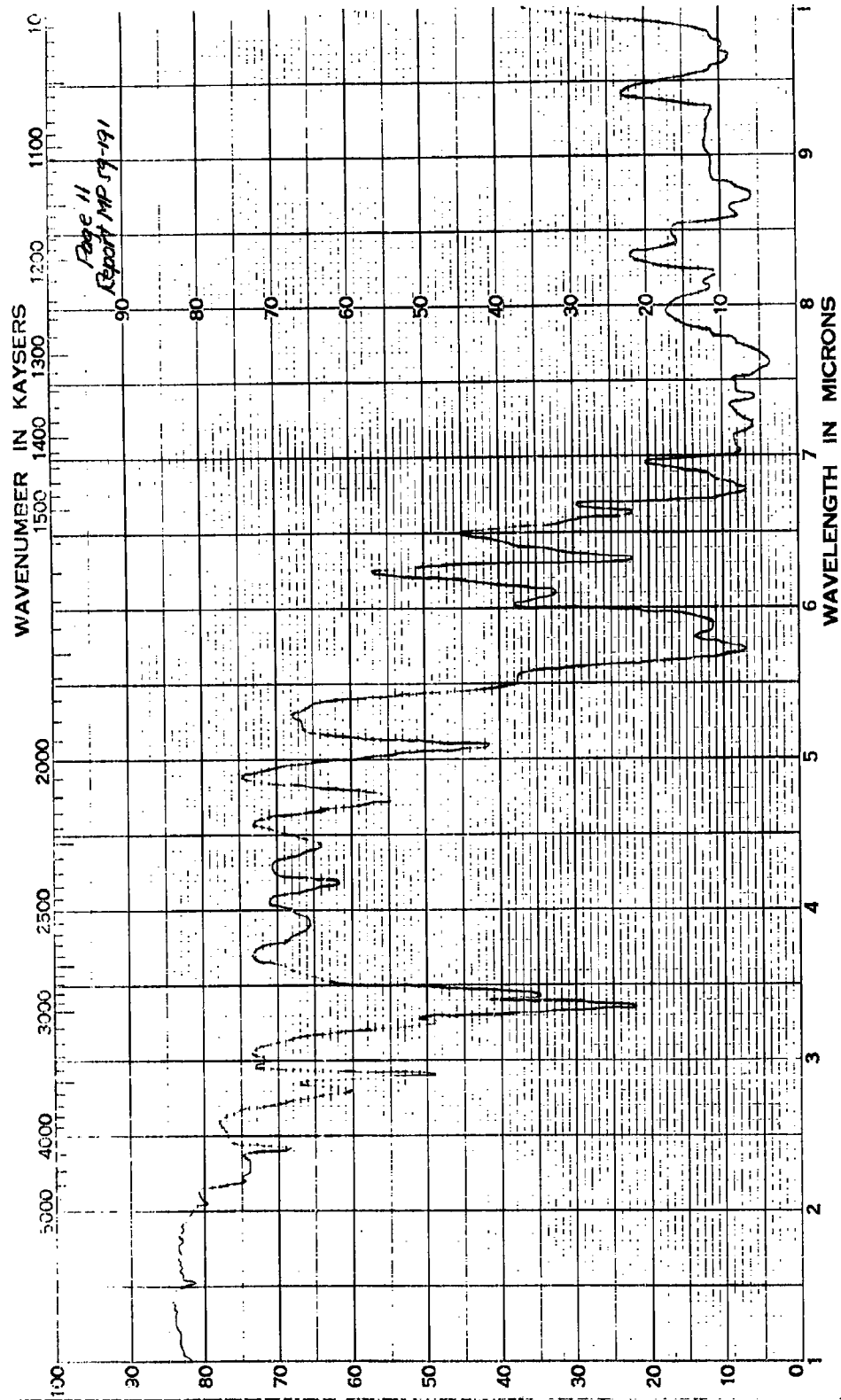
NO. 12

FORM

2.5 X 3.5 X 100X
Falkenberg
ANALYST

DATE 8-20-49





WHEN RECORDING SPEC BY CHART TO "DECKMAN SPECTROPHOTOMETER" USE DE 1. PRINCIPAL P. 1.14

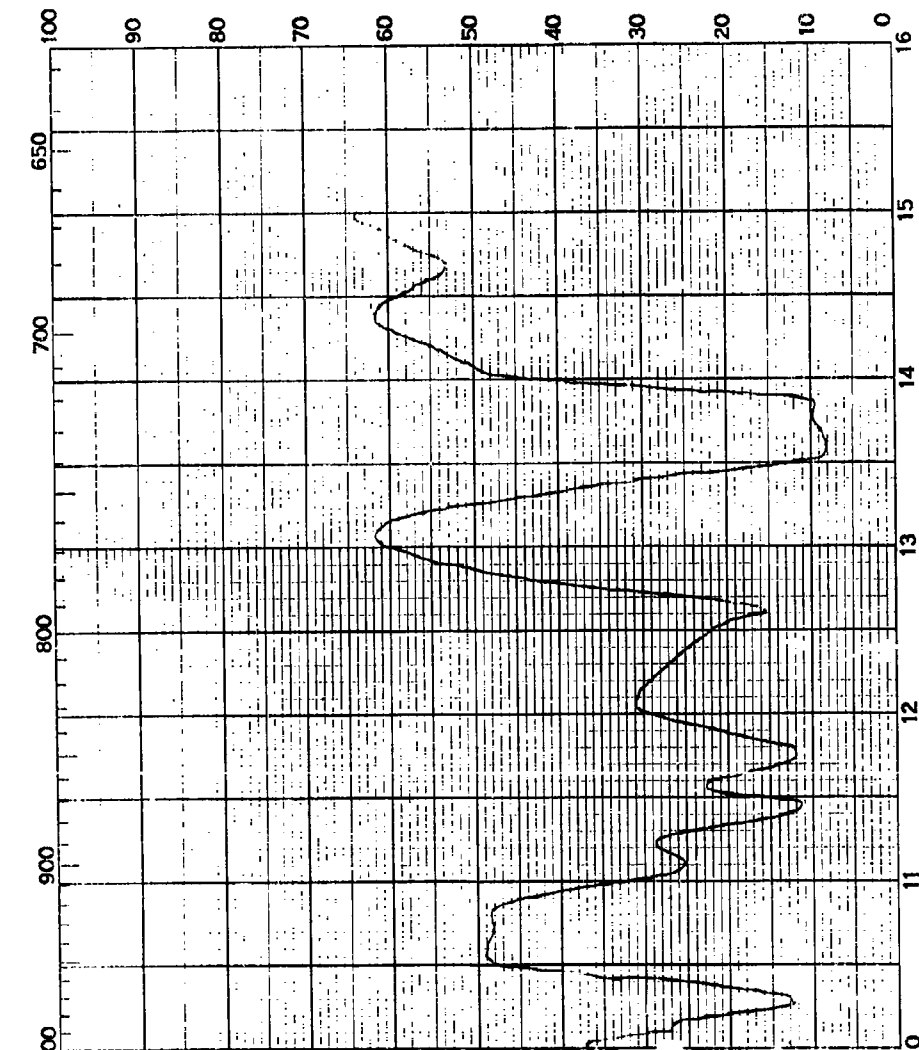


Figure 12
-peculiar reflection
SAMPLE #630 Chromo colored PS
Scottish Brand Film

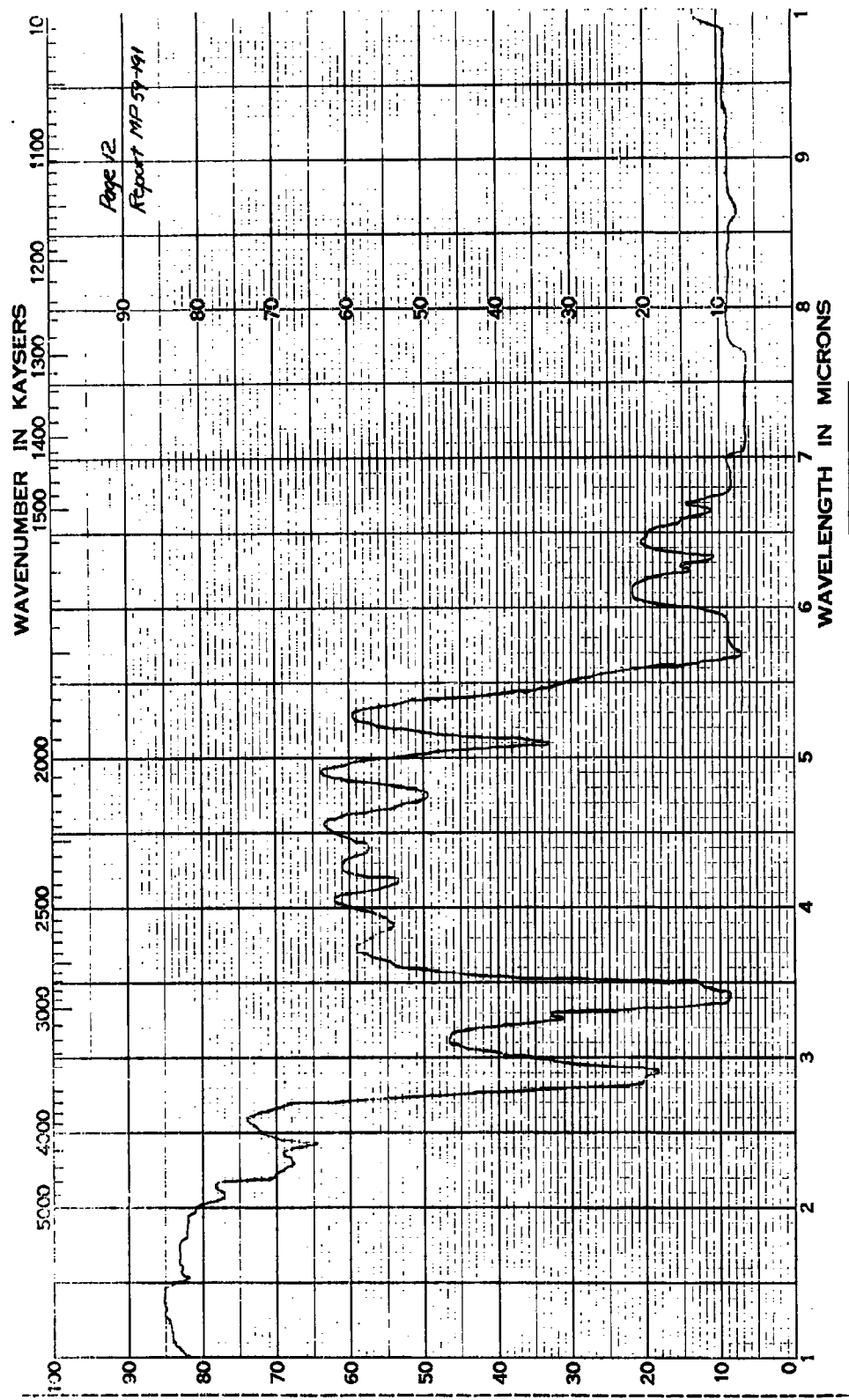
Page 11-1
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PATH _____ mm
SOLVENT _____
ORIGIN _____

REFERENCE _____
SOLVENT _____ AIR _____ X _____

SPEED 0.54 in/sec SCALE 1.0 in 10
GAIN 1.3%
PERIOD 2 SLIT SCHED. SOL 10 μm, 10 mm
ORIGIN SCALE 59
NOCI PRISM X DATE 4-20-59
ANALYST J. A. K. Berry

DECKMAN
SPECTROPHOTOMETER
MODEL 1R4



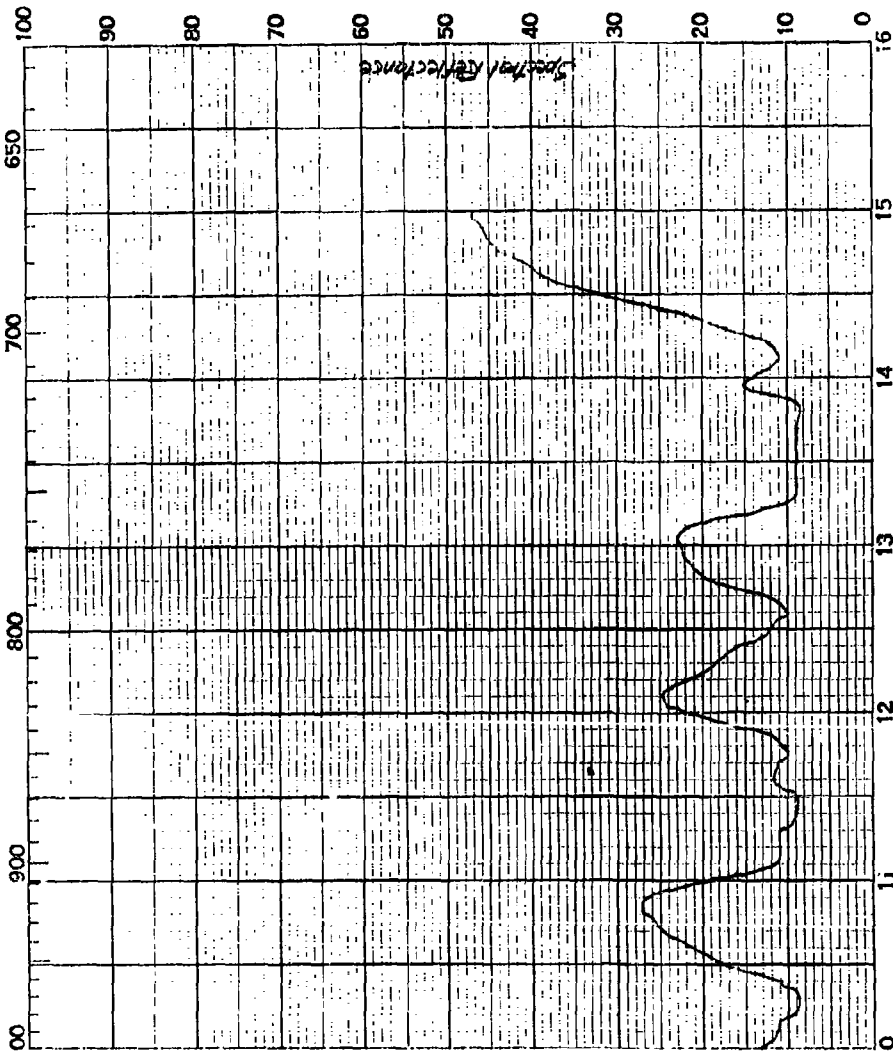


Figure 11
Spectral Reflectance
SAMPLE # 433 Gold Colored Scotch 21
Brand Film Page 12-1
Report # 1459-491

PATH 11mm
SOLVENT
ORIGIN

REFERENCE
SOLVENT AIR X

SPEED 54 /min SCALE 1 100
GAIN 1.3
PERIOD 2 SUT SCHED Set 1000 11 15mm
COORDINATE SCALE SR 10
INCI PRESS DATE 7-20-59
ANALYST Faulkner

BECKMAN
SPECTROPHOTOMETER
MODEL 124

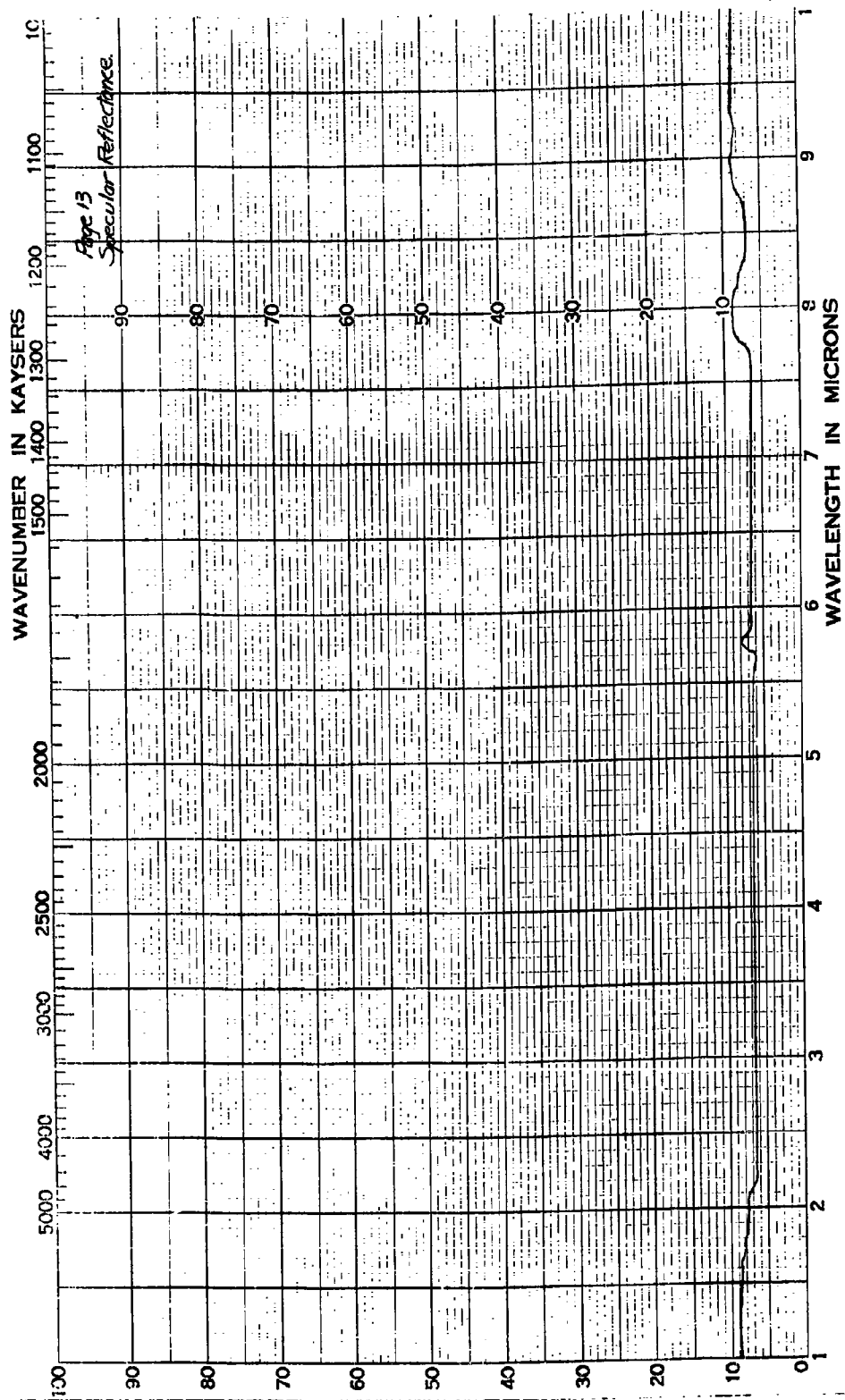


Figure 13
Specular Reflectance
SAMPLE#3220 Silver PS Flat Top
Scotchlite Brand Reflective Sheet
Page 13-1
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PATH _____ mm
SOLVENT _____
ORIGIN _____

REFERENCE _____
SOLVENT _____ AIR _____

SPEED 0.5 inches SCALE 1 in u
GAIN 1.5 90
PERIOD 2 SLIT SCH Sch. type 0.75mm.
ORDINATE SCALE SB DBX
NaCl PRISM DATE 9-20-59
ANALYST Faulkenberry

DECKMAN
SPECTROPHOTOMETER
MODEL 1R4

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